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G. L. SHOOK

SINTERING PAN AND GRATE THEREFOR

Filed Feb. 21, 1925

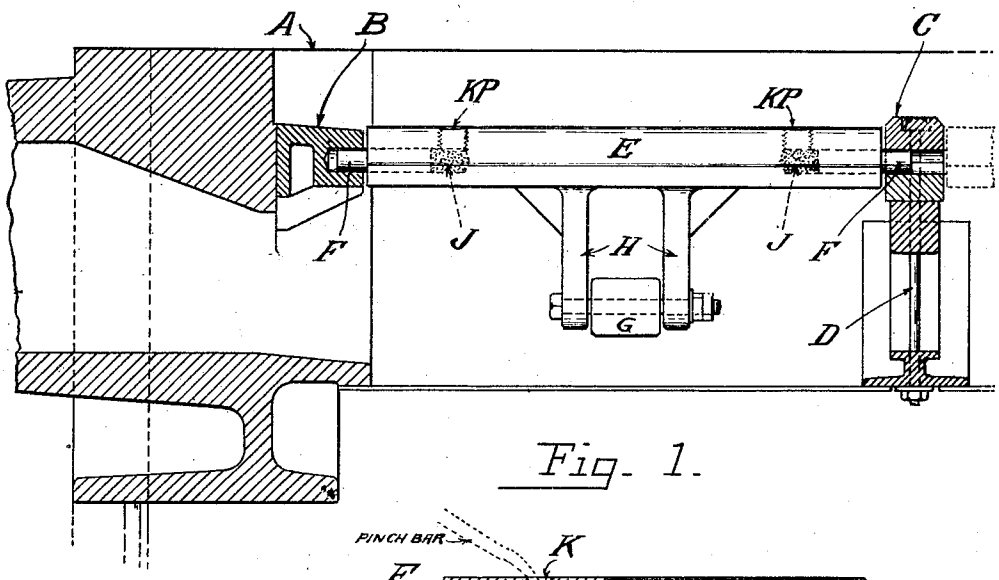


Fig. 1.

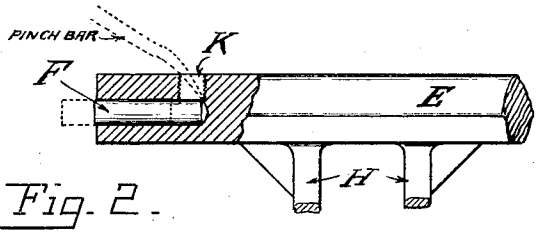


Fig. 2.

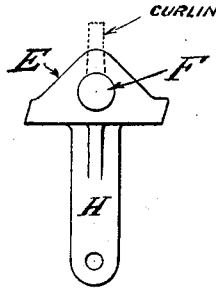


Fig. 3.

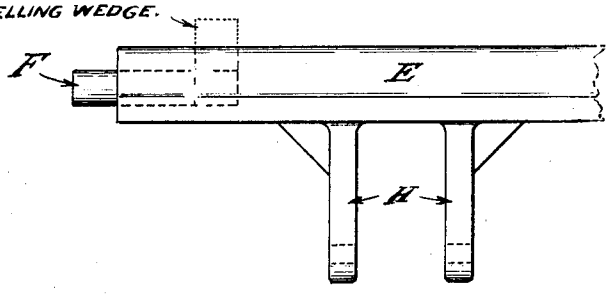


Fig. 4

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UNITED STATES PATENT OFFICE.

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SINTERING PAN AND GRATE THEREFOR.

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My invention relates to sintering pans, particularly to the grate-bars used therein, used in treating ores.

The use of sintering pans in the smeltery, for the treating of iron ore prior to its introduction into the usual blast furnace, is becoming general practice. Such pans comprise a considerable number of rocking grate-bars which rock under the urge of counter-weights as the pan is tipped. These grate-bars are trunnioned and are mounted in end "dead-bars" and transverse trunnion-bars so as to normally lie in juxtaposition. The counter-weights which control the grate-bars are either dependent therefrom or contact with arms which are. Each weight is usually connected to more than one of the bars so that the bars are forced to act in unison, although individual counter-weights for the bars may be used to advantage under some conditions.

In the present type of grate-bars used in sintering pans, the trunnions are formed by introducing a length of steel rod longitudinally therethrough, the length of the rod being enough greater than the overall length of the bar so that a part thereof will project beyond each end thereof when the rod is fastened in place.

Sintering pans and their contents are subjected to high temperatures and the grate-bars frequently become warped and burned to a degree which interferes with the perfect working of the pan and must be replaced. The transverse trunnion-bars, and the fastening bolts used to attach them in place, frequently become distorted to an extent which requires them to be replaced by others. In sintering pans the grate-bars are ordinarily placed in gangs of four or more bars, and to replace a couple of warped or burned out bars of the usual type may require the removal of two of such gangs. It is not usually possible to remove a single bar and to replace it by another of the usual types without first removing the whole of a gang. In sintering pans having grate-bars of the usual types, mounted and constructed as is the present practice, the replacement of either grate-bars or trunnion-bars is a lengthy and expensive operation. The length of time required to make such repairs requires the pan to be out of service for a very considerable period of time and may reduce the output of the whole plant by reason thereof.

A single grate-bar such as are used in these pans weigh from eighty to two hundred pounds, and if it be of the type to which a counter-weight is directly attached the weight may add as much more to the amount which must be handled in order to make a replacement. The grate-bars in sintering pans lie close to each other, in some cases being separated by only one eighth of an inch, and to get hold of a bar in a manner which permits the easy removal from, or placement in position in the pan is a difficult matter with present bars.

The object of this invention is to so improve the manner of forming and mounting the trunnions in the bars that individual grate-bars may be inserted in present pans with but little trouble and in a minimum of time. The manner in which I accomplish my object is illustrated in the accompanying drawings, in which:

Fig. 1 is a cross section through one of the end dead-bars and one of the trunnion-bars, showing one of my improved grate-bars in place.

Fig. 2 is a detail illustrating the location of the trunnion pins while placing the bar in position for them to be entered in their socket bearings in the end dead-bars or the trunnion-bars.

Figs. 3 and 4 are details illustrating a modified form of trunnion-pin socket and the side opening adapted to admit the means for holding the pin in adjusted position after it has been forced into its bearing.

The same reference characters refer to the same parts throughout the several views.

Referring to the drawings, A represents a portion of the frame of a sintering pan, B an end dead-bar, C a trunnion-bar, and D a trunnion-bar fastening bolt. E represents my improved grate-bar; F, F the trunnion pins; G the usual counter-weights; and H the counter-weight arm dependent from the grate-bar. J represents a granular filling material such as iron chips, or crushed cinder; K a threaded opening, and KP a plug adapted to close the same and prevent the filling from escaping.

To remove a distorted or otherwise defective part, as a grate-bar, trunnion-bar, or bolts from a sintering pan it is the common practice to cut the damaged parts with a cutting torch so that they may be readily removed from the apparatus. When for any reason it becomes necessary to remove a

grate-bar, it is a simple matter to cut off the trunnions at the ends so that the bar may be lifted out, but as the bars are heavy and lay close together it is not an easy matter under usual conditions to get a hold on the bar so as to handle it with ease. I plan, however, to drill and tap a hole (or holes) therein adapted to receive an eye bolt which can be readily attached to suitable lifting apparatus, and to initially provide my improved bars with like holes so that they may be easily handled when it is desired to place them in a pan when making replacements.

In my improved sintering pan grate-bar I form a trunnion-pin socket in each end thereof, these sockets preferably adapted to fit closely but slidably the trunnion pins F, and having a depth about equal to the length of the trunnion-pins. Opening into these sockets, at or near the bottom thereof, are side openings adapted to have introduced therein a suitable tool whereby the pins may be forced outward and into the bearings adapted to receive them. These side openings are also adapted to have introduced therethrough some suitable means for preventing the trunnion pin from moving inward after the same is introduced into its proper bearing. This means may be a wedge block adapted to be fastened in place by being hammered so as to expand the inner edge thereof, or it may be a thin edge wedge piece so shaped that the bottom edge will curl when the wedge is hammered into place. However I now prefer to wedge the pins against inward movement by introducing into the space between the bottom of the socket and the rear end of the pin when it is in adjusted position, a suitable granular material such as iron chips, or crushed cinder, packing the space full then introducing a plug to prevent its escape. This granular packing may be in loose form or it may be combined with a suitable cementing element such as a plastic compound which will harden under heating.

In some instances a single slidable trunnion-pin will be all that is required in order to permit the lowering of a grate-bar into place between the bearings adapted to carry it. In such a case a permanent trunnion may be used on one end.

I claim:

1. In a grate bar, the combination of a revoluble body with a socket in each end thereof, side openings leading from points near the bottoms of said sockets to the front face of the bar and through which trunnion pins in place in the sockets may be manipulated so as to be moved outward as into their appointed bearings; trunnion pins slidable in said sockets, the length thereof substantially equal to the depth of the sockets; granular material, as for instance crushed cinders, inserted through said side openings after the trunnion pins have been moved outward; and means for retaining said granular material in place whereby return movement of the trunnion pins is prevented.

2. In combination, a revoluble body having a longitudinal socket at each end, and a transverse bore opening into said socket adjacent the closed end thereof, a trunnion pin slidably mounted in each socket and adapted to be moved outwardly by a tool adapted to be inserted in said bore, means adapted to be poured through said bore into the socket to prevent endwise movement of the pin in one direction, and a removable plug normally closing said bore.

In testimony whereof I have affixed my signature.

GEORGE L. SHOOK.